UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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ART UNIT	PAPER NUMBER
3749	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
	10/056,040	WILD ET AL.
Office Action Summary	Examiner	Art Unit	
	CARL D. PRICE	3749	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-7_ is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) _1-7_ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a) ☐ All   b) ☐ Some * c) ☐ None of:

       1. ☐ Certified copies of the priority documents have been received.

       2. ☐ Certified copies of the priority documents have been received in Application No. _____.

       3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure
statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information
submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be
incorporated into the specification but must be submitted in a separate paper." Therefore, unless
the references have been cited by the examiner on form PTO-892, they have not been
considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
> subject matter which the applicant regards as his invention.

Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for
failing to particularly point out and distinctly claim the subject matter which applicant regards as
the invention.

In claim 1, it is unclear which one of the recited elements is "capable of interfacing to
either a flame rod or an ultraviolet burner control system independent of their manufacturer".

Claim 2 recites the limitation "all burners". There is insufficient antecedent basis for this
limitation in the claim.

Claims 2 and 3 recite the limitation "the memory means". There is insufficient
antecedent basis for this limitation in the claim.

US 5549469 shows and discloses a flame detection system for sensing flame in a burner
system reacting to the Ultra-Violet light emitted from a burner flame including in combination:

- a micro-computer module which interprets the frequency pulses from the UV
  sensor;
      (" …the microcomputer fails to output the trigger pulse at the
      appropriate frequency, …")
- a flame signal generation module which creates and output flame signal
  proportional to the signal sensed at the sensing tube input (80) and capable of

interfacing to either a flame rod or an ultraviolet burner control system
independent of their manufacturer;

> ("The flame relay modules 30-33 also have terminal strips associated
> with them. A terminal strip 43 is provided for connections to the flame
> relays 30 and 31. It provides connections for either a flame rod or an
> ultraviolet sensor or, in the case where an associated burner has both,
> both such transducers. A similar terminal strip 44 is provided for
> connections to the flame relays 32, 33.")

- wherein the memory means includes non-volatile memory means for storing
status information on the system, the non- volatile memory means having
sufficient capacity to store information on all burners and maintain said
storage in the event of power failure upon system shutdown;

> ("The microcomputer 50 has a memory associated therewith. In the
> illustrated implementation, the memory 50a is an element of the
> microcomputer itself. The program is stored in a non-volatile section of
> memory 50a and provides a sequence of steps which drive the
> microcomputer in the various modes to be described below. The
> memory 50a also includes a section of RAM 50b which serves as
> operating memory and also as an updatable status memory. The status
> memory retains information on system status for readout and analysis in
> the event of a flame failure.")

- wherein the memory means includes a plurality of words of storage for storing
information regarding system faults as they are detected for later scanning of
the stored fault information to detect patterns therein;

> ("Thus, the microcomputer 50 will acquire a sequence of digital words
> representative of the flame quality output of the flame relays.")

- a flame watchdog timer triggered by the processor and having an output
serving as an enabling signal for fault relay which enables the flame sensing
output; and

> (" A further significant safety feature of the invention resides in the use
> of watchdog timers which are both software and hardware interrelated.
> A pair of such timers 240, 241 are provided. In the preferred
> embodiment, they are 4530 type timers; the resistor/capacitor networks
> which set the period for the timers is not shown in FIG. 5. Both timers
> have trigger inputs which are controlled by an output 242 from the
> microcomputer. Preferably in the illustrated embodiment, the line 242 is
> the upper bit line of the C Port PC7. However, any output word can be
> used, so long as the microcomputer 50 drives that line to its active state
> periodically, within the period established by the timing networks
> connected to the watchdog timers 240, 241. If the trigger is not serviced
> within the period of the watchdog timer, the timer will time out, with
> results to be described below. The fact that the microcomputer 50 has
> not serviced the watchdog timer within the preset period is an indication
> that something in the system is amiss; the watchdog timers are

> configured to cause an appropriate shutdown or a circuit limitation
> based on the nature of the fault.")

- a polling module.
  > ("In practicing an important aspect of the invention, at least one of the
  > switches 212 is used to fixedly program in a number corresponding to the
  > number of flame relays in the particular installation for the control system.
  > Thus, if the system has 9 burners, the switch 212 would be set to an output
  > on bus 214 corresponding to the number 9. Prior to invoking startup
  > module, a polling module is invoked in which the microcomputer 50 is
  > caused to read the information on bus 217.")

US 5549469 shows and discloses the invention substantially as set forth in the claims with possible exception to:

- a self-checking module functioning to determine the proper operation of the sensing element; and
- a micro-computer module **which interprets the frequency pulses** from the UV sensing tube and allows for degradation and changes in sensor sensitivity.

US 5236328 (Tate et al) teach, form applicant's same combustion flame sensor field of endeavor, a combustion control system including a self-checking module functioning to determine the proper operation of the sensing element and a micro-computer module which interprets the frequency pulses from the UV sensing tube and allows for degradation and changes in sensor sensitivity.

US 5236328 (Tate et al) discloses:

(6)   Flame sensor operation can deteriorate or become marginal for a number of reasons such as degradation of the sensor's internal elements, or dust and moisture which affects operation. The ability to detect both the pilot flame and the main flame at the appropriate times in the burner startup sequence requires precise initial alignment of the flame sensor and competent maintenance thereafter. When flame sensor operation deteriorates in this way for any reason, nuisance shutdowns may occur because of failure to detect the presence of a flame which is actually present.

(7)   This deterioration of a flame sensor is a gradual process which eventually results in its signal shifting out of the ranges specified for presence or absence of flame when the particular condition exists. This deterioration requires sensor replacement or maintenance when the erroneous signal causes the control system to unnecessarily shut down the burner system. Delaying replacement or maintenance may cause these

nuisance shutdowns to occur at a time when the repair will be expensive or inconvenient. Accordingly, it would be useful to determine sensor deterioration before actual sensor signal failure occurs and while flame sensor operation is still safe.

9)   These problems of flame sensor operation in a burner system can be detected before the problem causes nuisance shutdown of the system with the resulting inconvenience and expense. Normally, the sensors now in use provide a signal which is substantially greater than the threshold level when flame is present and substantially less than the threshold level when flame is not present. The solution to this problem is an improvement which at appropriate times depending on the condition of the standby signal, **senses drifting of the sensor signal level** into one of the ranges which is adjacent to the threshold level. Presence of the sensor signal in the adjacent range may be used to **indicate abnormal performance** of the flame sensor with a first state of a sensor performance signal. **The first state of the sensor performance signal can be used to trigger some sort of visual or audible indication which will alert the operator to service the flame sensor during scheduled maintenance of the burner system**.

(10)   While it is possible to implement this improvement with individual logic and circuit elements, **it is much more efficient to simply program the microprocessor** already present in the system to perform these sensor abnormality detection functions. It is well known to electronic system designers how to replicate hardware functions in **software within a microprocessor. The particular mode, hardware or software, of implementing these functions is a simple matter of design choice and will be considered as fully equivalent hereafter**.

(11)   This improvement includes a signal level detector receiving the flame sensor signal and **providing a test signal responsive to the flame sensor signal falling within a signal level range** defined at one end by the flame threshold level and at the other end by a test level displaced by a predetermined amount from the flame threshold level. **Logic means receive the test and standby signals. Responsive to concurrence of a predetermined state of the standby signal and the test signal, the logic means issue the sensor performance signal with its first state.** The sensor performance signal has its second state otherwise. **In a software implementation**, the flame sensor signal is converted to a digital value by some analog to digital device well known to those familiar with control system design. In a hardware implementation, an operational amplifier may compare the flame sensor signal level with threshold and test levels generated by a divider network and **provide a logic level output** which varies depending on the relationship between the flame sensor signal and the threshold and test levels.

(16)   **Yet another object of this invention is to selectively** replace or **adjust flame sensors** during scheduled burner system maintenance only when operation is likely to become marginal before the next maintenance, thus avoiding the expense of unneeded sensor replacement or adjustment, or of emergency repairs.

In regard to calims 1-7, for the purpose of monitoring degradation and changes in sensor sensitivity, it would have been obvious to a person having ordinary skill in the art to provide the microcontroller operated combustion system of Wild et al to include additional an self-checking means functioning to determine the proper operation of the sensing element, in view of the teaching of **US 5236328 (Tate et al)**.

Conclusion

See the attached USPTO for, 892 for prior art made of record and not relied upon which is considered pertinent to applicant's disclosure.

JP 05256441 A COMBUSTION DIAGNOSING DEVICE:

ABSTRACT:

PURPOSE: To enable an **automatic adjustment of an applied voltage** for an **opto- electrical converter** to be performed and **to improve a reliability** of combustion state diagnosis in a combustion diagnosing device in which a flame of a burner detected by an optical probe is divided and converted into an electrical signal and a flame combustion state is diagnosed in response to the electrical signal.

CONSTITUTION: Each of a plurality of flames 2 of a plurality of burners 1 arranged in a boiler is detected by optical probes 3. Light from each of the optical probes 3 is scanned by an optical scanner 5 and sent in sequence to an optical divider 6, and then the light after divided is converted into an electrical signal by an opto- electrical converter 7. This electrical signal is sent to a control device through an amplifier 8 and an A/D converter 9, a combustion state of each of the burners 1 is **diagnosed and a result of diagnosis** is displayed in a displaying device 11. The diagnosing device described above is provided with a calculation control device 17 for sending an applied voltage adjusting signal 16 to a power supply 14 for the opto-electrical converter. In the case that an S/N ratio of a digital signal from the A/D converter 9 is inferior, the **applied voltage adjusting signal 16** is outputted, and then the applied voltage for **the opto-electrical converter 7 is adjusted in such a manner that the digital signal becomes a proper value.**

JP 05026433 A TROUBLE-DIAGNOSING APPARATUS FOR ULTRAVIOLET RAY DISCHARGE TUBE

ABSTRACT:

PURPOSE: To obtain the title apparatus for an ultraviolet ray discharge tube (UV tube), which apparatus quantitatively detects the sensibility to ultraviolet rays discharged from the UV tube and can diagnose the trouble of the UV tube.
CONSTITUTION: High voltage at point A is periodically switched by an astable oscillation circuit 11, a monostable oscillation circuit 13, transistors 12, 14, etc., and is applied to a UV tube 1. At this time, a discharge pulse is generated by the UV tube 1, and is converted to voltage by a F/V converter 16. On the basis of this voltage, **the UV tube 1 is diagnosed by a trouble-diagnosing circuit 17**. Since the sensibility of the UV tube can be quantitatively detected as analog value, the **state of trouble and deterioration** of the UV tube **can be accurately diagnosed** thereby. At the same time, for example, **the sensibility of a flame relay** can be **easily regulated by regulating reference voltage** for a comparator.

USPTO CUSTOMER CONTACT INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CARL D. PRICE whose telephone number is (571) 272-4880. The examiner can normally be reached on Monday through Friday between 9:0am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven B. McAllister can be reached on (571) 272-6785. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/CARL D. PRICE/

Primary Examiner, Art Unit 3749